

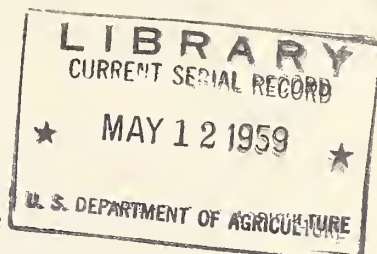
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UNITED STATES  
DEPARTMENT OF THE INTERIOR  
Fish and Wildlife Service  
Bureau of Sport Fisheries and Wildlife  
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Wildlife Leaflet 402  
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ANTICOAGULANT RODENTICIDES FOR CONTROL OF RATS AND MICE

Anticoagulants are chemicals that reduce or prevent the clotting of blood. Used as a poison an anticoagulant causes death by internal bleeding. Anticoagulants currently registered for the control of rats and mice include diphacin, fumarin, pival, PMP, and warfarin.

These materials are the poisonous ingredients in many rodenticide baits sold under various brand names. They are also sold as concentrates for mixing home-made baits, or as powders which can be dissolved in water. They are effective for the control of house mice and domestic rats found in the United States.

Anticoagulants seldom kill by a single dose, but must be fed upon several times over a period of days. Feeding does not have to be on consecutive days, but should occur within a 10-day interval with no longer than 48 hours between feedings. It is important that plenty of bait be available at all times. Rodents may not eat the bait when it is first offered, so it may take from 5 to 14 days to get rid of them by this method; for house mice it often takes longer. In most instances less bait is eaten, and less damage done by the rats or mice, after about the third day of treatment.

Anticoagulants will kill most animals if they eat enough, over a long enough period of time. Hogs are especially susceptible to anticoagulants. However, the amount of anticoagulant contained in bait mixtures is so small that with reasonable precautions there is little danger to domestic animals. Mixing the anticoagulant with grain or cereal-type bait serves to protect most pets as they do not usually care for such foods. Another safeguard is to place the bait in "bait stations" where rats and mice can get to it but larger animals cannot.

Anticoagulant preparations should not be left where children or irresponsible persons can get to them. If accidentally swallowed, induce vomiting at once and call a physician.

## Dry Baits

Ready-To-Use-Baits. There are many satisfactory commercial baits on the market containing anticoagulants. These ready-made baits are more convenient, but not necessarily better than home-made baits.

Home-made Baits. The most economical dry bait is a home-made bait, mixed with an anticoagulant concentrate according to the manufacturer's instructions (generally 1 part of 0.5% anticoagulant concentrate is mixed with 19 parts of food ingredients). Thorough mixing is required.

The following mixture (by weight) makes a satisfactory bait:

12 parts	ground whole yellow corn
5 parts	rolled oats
1 part	granulated sugar
1 part	vegetable oil
1 part	anticoagulant concentrate (or as recommended by the manufacturer)

For control of house mice, it may be advisable to double the amount of anticoagulant.

It is of prime importance that only fresh bait be used. Bait stations should be cleaned frequently and all old or contaminated bait discarded. Perishable foods such as ground meat or fish can be used, substituting them for the cereals, sugar and oil, but they must be replaced daily or every other day; and their use increases the hazards to pets.

If insects are a problem in packaged or stored cereal baits, it may be advisable to add 0.01% technical malathion (95% malathion - 5% corn oil). This is a specialty item only available from S. B. Penick and Company, 50 Church Street, New York 8, New York, and Prentiss Drug and Chemical Company, 101 West 31st Street, New York 1, New York. No other form of malathion or other insecticides should be used.

## Water Baits

Where rodents are especially troublesome, water-soluble anticoagulant concentrates are a useful supplement to dry baits, when put out at the same locations. Water bait is more effective during the summer months or in locations where other water is not

readily available. Ordinary pint-sized chick founts or commercial dispensers may be used in bait boxes or stations. Liquid containers should be cleaned and replenished frequently. Many liquid concentrates contain sugar which improves acceptance. If it is not included in the concentrate, 1 or 2 tablespoons can be added to each quart of water.

Instructions for Placing Bait Stations. Baits should be exposed in shallow open trays or water founts in areas frequented by the rodents. Protected feeding stations or bait boxes are recommended for locations where there may be a hazard to humans and domestic animals (see accompanying illustrations). They are particularly helpful as permanent installations in poultry houses, granaries, and other locations subject to frequent reinfestation. Rats may often be prevented from entering warehouses and other buildings by the establishment of permanent-type bait stations in suitable locations around the perimeter of the buildings.

From 4 ounces to 1 pound of bait is recommended for each rat bait placement. Baits should be inspected daily and replenished as necessary. Similar bait placements can be used for mice, but they should be smaller, there should be more of them, and (since house mice do not travel very far from their nests) they should be closer together. Tablespoonful quantities are generally adequate for each mouse bait spot. It is important to remember that anticoagulants will not kill unless the rodents have plenty of bait available during the 5 to 14-day feeding period. Replace baits as often as necessary to keep them fresh. Frequent replacements will be necessary in warm humid climates.

### Miscellaneous

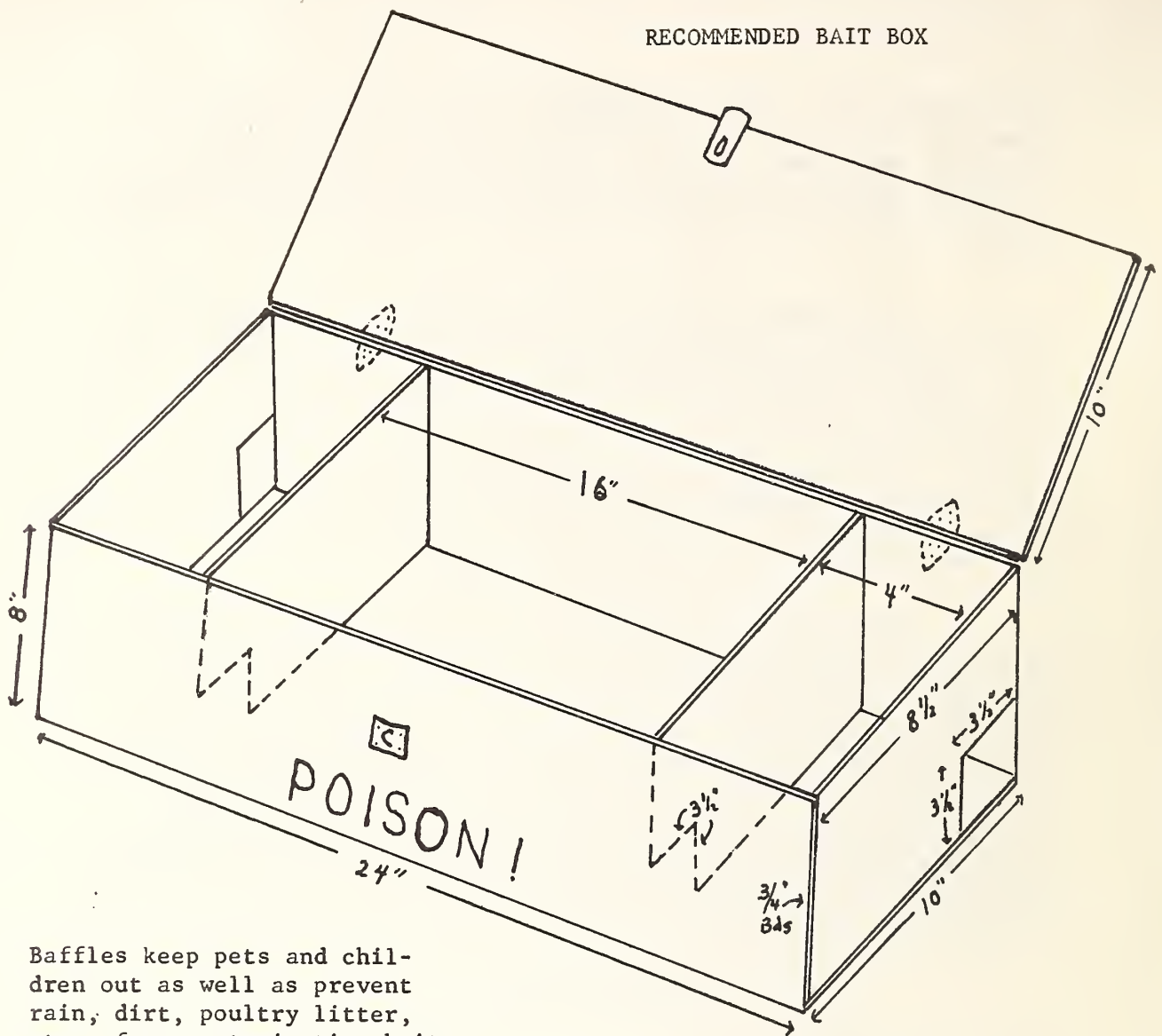
In locations heavily infested with rats, other poisons may be used to obtain a quick kill, followed up with anticoagulant-poisoned baits to eliminate wary, bait-shy individuals.

Unpleasant odors from dead rats may follow the use of anticoagulants, as with other poison. Poisons do not prevent rat carcasses from decaying. Placing baits in the basement (or not higher than the first floor) will help keep odors where they are not so objectionable. Commercial preparations, neutrolem alpha or isobornyl acetate, will help to minimize odor.

In cases of heavy or difficult infestations of rats or house mice, specialized methods are often necessary; in such cases the services of a pest control operator or exterminator may be required.



# RECOMMENDED BAIT BOX



Baffles keep pets and children out as well as prevent rain, dirt, poultry litter, etc., from contaminating bait.

Simple bait stations for temporary bait placement may be made by using 1 x 8 inch boards, preferably 4 to 6 feet long and securely fastened to the wall.

